

**TECHNICAL DOCUMENT AND RESEARCH CENTER
KING COUNTY DEPARTMENT OF
NATURAL RESOURCES AND PARKS**

Reclaimed Water Program
Demonstration Phase

Identification of
Potential Satellite Projects for
Direct Non-Potable Uses

Summary Report



KING COUNTY
Department of
Natural Resources

December 2000

RECLAIMED WATER

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TM AWSA 200: Future Regional Wastewater Treatment Plant

D. Ranking of Potential Projects

Acronyms and Abbreviations

The following list includes acronyms and abbreviations used throughout this document.

| | |
|---------|---|
| ccf | hundred cubic feet |
| CP | construction phase |
| CSO | combined sewer overflow |
| DNS | determination of non-significance |
| DE | design phase |
| DOH | Washington State Department of Health |
| Ecology | Washington State Department of Ecology |
| EIS | Environmental Impact Statement |
| EPA | Environmental Protection Agency |
| ESA | Endangered Species Act |
| FP | Financial Policy |
| FPP | Farm Preservation Program |
| GIS | Geographic Information System |
| KCDNR | King County Department of Natural Resources |
| mgd | million gallons per day |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NPDES | National Pollutant Discharge Elimination System |
| O&M | operation and maintenance |
| PD | predesign phase |
| PDD | peak-day demand |
| PHD | peak-hour demand |
| PL | planning phase |
| psig | pounds per square inch gauge |
| RFN | Request for Project Nominations |
| RWSP | King County Regional Wastewater Services Plan |

| | |
|------------|---|
| SEPA | State Environmental Policy Act |
| Task Force | Reclaimed Water Task Force (established by KCDNR in 1999) |
| TEWR | Technical, Environmental, and Water Rights |
| UD | Utility District |
| USFWS | U.S. Fish and Wildlife Service |
| WD | Water District |
| WSD | Water and Sewer District |

Introduction

Needs Statement

"Recycling and reusing highly treated wastewater effluent should be investigated as a significant new source of water to help increase base flows for fish in the summer, provide additional flushing flows for smolts in the spring, supply additional water for the Region's non-potable uses and defer the need to develop new potable water supply projects."

The Water Reuse Policy Development Task Force adopted the above Needs Statement in 1997 to define the role of reclaimed water use as part of the Regional Wastewater Services Plan (RWSP). The King County Department of Natural Resources (KCDNR) is striving to achieve the intent of the Needs Statement by developing a Reclaimed Water Program that promotes and increases the use of reclaimed water to improve the quality of life for King County residents and to balance the water resource needs of both the environment and people. The use of reclaimed water could potentially provide additional supply for non-potable and indirect potable uses, defer the need to develop new potable water supply projects, and augment instream flows for fish. To achieve these goals, KCDNR's intent is to develop the reclaimed water program in phases.

The first phase involves undertaking a series of studies and projects including a technology assessment study, a stakeholder participation strategy, a demonstration satellite plant project feasibility and selection process, and a public outreach effort. This report summarizes the work and results of the first phase, which is referred to as the Demonstration Phase. The goals of the Demonstration Phase are to:

- Identify potential satellite treatment plant locations to produce reclaimed water for direct, non-potable irrigation and industrial applications
- Implement and monitor new technologies associated with water reclamation
- Demonstrate environmental benefits and provide educational opportunities to the community through the use of reclaimed water
- Support and/or complement existing King County programs, i.e., Combined Sewer Overflow Program or Farm Preservation Program
- Develop cost recovery mechanisms for water reuse projects
- Generate regional interest and support for water reuse projects that meet the stated goals

KCDNR's efforts have centered around development of demonstration projects as the keystone of the Reclaimed Water Program. This included collecting data and information to define the development of the Reclaimed Water Program through three elements:

- Stakeholder Strategy
- Public Outreach Strategy
- Information Compilation and Analysis

KCDNR used the data from these efforts to develop a list of potential demonstration projects using the following steps:

- Identify Potential Projects
- Rank Potential Projects

The result of these activities was a list of potential projects which could be further evaluated and potentially implemented within the Demonstration Phase of the Reclaimed Water Program. The potential demonstration projects include satellite treatment plants and direct non-potable uses for reclaimed water. KCDNR has worked with the stakeholder task force (see Section 2) to develop the evaluation and selection process used in the Demonstration Phase. The process is consistent with the Reuse Policies identified in the RWSP as adopted by the County Council.

SECTION 2

Stakeholder Process

In 1999, KCDNR established the Reclaimed Water Task Force (Task Force) to build on the work of the Water Reuse Policy Development Task Force, which was established in the mid-1990s and made recommendations concerning the role of reclaimed water as a part of the RWSP. The current Task Force was established to assist KCDNR in further developing its Reclaimed Water Program through implementation of the Demonstration Phase.

The stakeholder Task Force was initiated to ensure that strategy development and implementation were carried out in consultation with interested parties, including KCDNR's regional partners, the state, water and sewer agencies, and others. A complete description of the Task Force member representation, mission statement, and meeting minutes can be found in the *Report of the Reclaimed Water Reuse Task Force*, dated December 2000.

Three subcommittees were established to address specific related issues and policy questions that have arisen:

- Financial Subcommittee
- Technical, Environmental, and Water Rights Subcommittee
- Public Outreach Subcommittee

The Task Force considered recommendations and action items presented by each of the subcommittees. The recommendations and action items developed by the Financial Subcommittee and the Technical, Environmental and Water Rights Subcommittee are presented in a separate document titled *Report of the Reclaimed Water Task Force* (December 2000). These recommendations are being submitted to KCDNR for review and for use in developing implementation guidelines for the Demonstration Phase. A brief summary of the work conducted by the subcommittees is presented below.

KCDNR worked with the Public Outreach Subcommittee to develop a strategy for conducting a successful public outreach effort for the Demonstration Phase. A brief summary of that strategy is presented below and the complete document can be found in *Identification of Potential Satellite Projects for Direct Non-Potable Uses—Appendices*, December 2000.

Financial Subcommittee

The Financial Subcommittee was formed to develop recommendations pertaining to the financial structure and elements of a water reuse program. The subcommittee recognized that any recommendations developed during the Demonstration Phase would not necessarily apply to a full-scale facility; therefore, the recommendations developed are only for the Demonstration Phase and will be reviewed and reevaluated by King County during future phases.

The recommendations developed by the Financial Subcommittee are intended to create a viable Demonstration Phase that meet the stated goals of the program. Issues that were discussed included the role of KCDNR as a wholesaler providing reclaimed water to local retail water purveyors or customers, the funding mechanisms and potable water rates and how those issues could affect the water reuse rate structures, whether the presence of valid water rights would affect water reuse rates, and the development of a financial program consistent with KCDNR's existing permits and policies.

Based on extensive discussions of these issues, the Financial Subcommittee developed ten recommendations and presented them to KCDNR for review. In addition, the subcommittee developed an action item for the Washington State Department of Ecology (Ecology) to establish a regulatory policy that would address the issue of exchanging valid water rights for reclaimed water.

Technical, Environmental, and Water Rights Subcommittee

The Technical, Environmental, and Water Rights (TEWR) Subcommittee was convened to develop a series of recommendations and action items regarding the environmental benefits and water quality issues associated with reclaimed water, substitution of existing water rights with reclaimed water, and the logistical details necessary to implement a water reuse program. Recommendations developed by this subcommittee were intended to apply to the Demonstration Phase with the intent of reviewing and revising recommendations as appropriate to facilitate the long-term operation of a reclaimed water system.

The TEWR Subcommittee deliberated on a broad spectrum of issues given the nature of the material that was assigned. In general, the TEWR Subcommittee discussed the importance of benefits to fish from reuse projects, the difficulty in quantifying some environmental benefits, the importance of developing a mechanism to encourage the use of reclaimed water among valid water-rights holders, and the necessity of developing agreements with reclaimed water users to ensure that KCDNR maintains compliance with applicable permits and policies.

Based on extensive discussion of these issues, the TEWR Subcommittee developed six recommendations that were presented to KCDNR for review. In addition, the subcommittee developed four tasks for KCDNR, Washington State Department of Health (DOH), and Ecology to consider in developing a work plan for implementation of the Demonstration Phase.

Public Outreach Subcommittee

The Public Outreach Subcommittee was formed to work with KCDNR to develop a reclaimed water public outreach strategy to ensure that community values are considered and included in the development of the Reclaimed Water Program. Public acceptance and support for the Reclaimed Water Program will be key factors in ensuring any project's timely completion and overall success. The Public Outreach Subcommittee defined three objectives for a reclaimed water public outreach strategy:

- Geographic-based education for demonstration projects
- General education about the KCDNR reuse program
- Rapid response to developing issues

With these objectives in mind, as well as a definition of various “publics” or audiences and the issues that would be of interest to them, a public outreach strategy was developed. Following is a brief synopsis of the major elements of the Public Outreach Strategy; the complete document is presented in Appendix A.

The Public Outreach Strategy defines both short- and long-term goals. The immediate needs associated with demonstration programs are defined, while recognizing the importance of a regional outreach program to the long-term success of a water reuse program. Thus, neighborhood interests and concerns are addressed at the same time the groundwork is being laid for long-term regional awareness. Although the focus and the specific goals of short-term outreach strategies are different from the focus and goals of long-term strategies, short- and long-term strategies must complement and support each other.

The Public Outreach Strategy defines the approach to addressing the four major issues associated with KCDNR’s Reclaimed Water Program: (1) public health and safety; (2) public acceptance; (3) environment; and (4) operations. These issues can pose serious challenges and opportunities that can affect the ultimate success of KCDNR’s Reclaimed Water Program. By defining the issue areas in advance, KCDNR can develop public outreach strategies and tactics to address and resolve them.

Proposed outreach efforts are divided between general efforts and site-specific efforts. General outreach efforts refer to the strategy and tactics used for the region at large and address the need to make regional decisions related to water reuse management. General outreach targets regional elected officials, media, organizations, and stakeholders and addresses water reuse at a general level. Site-specific efforts include outreach efforts conducted with the communities in which the demonstration projects may be implemented or with reclaimed water used at specific locations. This type of outreach focuses on specific target audiences and a set of messages based on the issues that are of concern to a particular community or user group.

The message that is promoted by KCDNR must be consistent and must be repeated often in the various modes of communication. The general program messages include:

- **Safe** – “Reclaimed water has been treated to provide clean, safe water for beneficial uses.”
- **Good for the environment and economy** – “Reclaimed water can provide an environmentally friendly, drought-resistant water source that is available year round.”
- **Saves our supply of drinking water** – “By using reclaimed water for irrigation, industry, and other appropriate beneficial uses, we can save our current sources of supply for other beneficial uses such as drinking.”

- **Valuable, limited resource** – “Water is a valuable resource that we can conserve by using it over and over again.”
- **Planning ahead** – “Our community is planning ahead to make sure people, fish, and wildlife have a quality, reliable water supply for the future.”
- **Innovation** – “Because high quality supplies are limited, we must look for new and innovative ways – like conservation and reclamation – to use this precious resource wisely and efficiently to meet our future needs.”
- **Phased approach** – “King County is evaluating various beneficial uses for reclaimed water and will implement a water reuse program in a thoughtful, phased approach, the first phase of which includes non-potable water reuse for irrigation and industrial purposes.”

To increase the public’s awareness and education about water reuse, KCDNR must communicate with both internal and external audiences. The list includes King County internal groups and individuals, community interest groups, government and regulatory representatives, environmental groups, recreational interests, business interests, schools, agriculture-related groups, the media, and others. KCDNR will identify the particular interests of the groups or individuals and assess what is important to the groups about a particular project, issue, or activity. Understanding the goals and concerns of individual audiences will help KCDNR identify how its projects are important to those groups, will help both parties meet mutual goals, and will provide specific information about water reuse benefits.

Strategies and tactics were developed for each of six major categories so that KCDNR could maintain the necessary flexibility to adjust to unforeseen challenges and opportunities. The six categories are: (1) plan development and research; (2) community relations; (3) media relations; (4) governmental relations; (5) information materials, and (6) internal communications. Proposed strategies and tactics in each category are discussed in Appendix A.

As final components, the Public Outreach Strategy proposes a “rapid-response program,” to assist KCDNR in managing change as the program proceeds. The rapid-response program allows KCDNR to be prepared to address critical and immediate concerns, correct misinformation, and ensure that accurate information is disseminated to all audiences. Over the course of the project, external events and program changes must be assessed and the outreach strategy revised as needed.

SECTION 3

Information Compilation and Analysis

To make informed decisions about the appropriate reclaimed water uses and potential sites for demonstration satellite plant facilities, it is essential that KCDNR compile all available, applicable data. The data to be analyzed include current and future water uses that could be replaced with reclaimed water, the location of large volumes of source wastewater, existing related programs, funding options, and the fundamental steps required to implement a reclaimed water project. A series of technical memoranda were developed for each of these categories. The complete set of technical memoranda are presented in Appendix B and summarized in each of the following sections.

Location of Potential Reclaimed Water Users and Large Volumes of Source Wastewater

KCDNR researched various sources to develop a database of opportunities to use reclaimed water that are located within a set distance from KCDNR sewer interceptors that currently convey more than 3.0 million gallons per day (mgd) average annual flows. These data were portrayed graphically on Geographic Information System (GIS)-based mapping. By adding the criterion of looking only at potential irrigation users located within one mile of the identified interceptors, the data could be used as an initial screening of potential reclaimed water application sites for the Demonstration Phase of the Reclaimed Water Program. The complete analysis is presented in Appendix B. A summary of the data is presented in Table 3-1.

TABLE 3-1
Potential Irrigation Users within One Mile of Sewer Interceptors

| Number of Sites | | Use | Total Volume per Use (mgd) |
|-----------------|-----------|--------------|----------------------------|
| 9 | | Cemeteries | 1.825 |
| 19 | | Golf Courses | 9.493 |
| 60 | | Parks | 3.665 |
| Total: | 88 | | 14.983 |

Incorporating Information from Other County Projects Affecting the Reclaimed Water Program

To be able to compare potential reclaimed water projects uniformly, a standard costing procedure must be used for all elements. The cost estimating procedures used in this analysis were taken primarily from either *Water Reclamation and Reuse: A Feasibility Study for the King County Metropolitan Area* (ECONorthwest et al., 1995) or KCDNR's *Regional Wastewater Services Plan* (RWSP) with a few modifications. The complete details of the costing procedures are provided in Appendix B. A summary of the primary features is presented below.

In accordance with the earlier referenced study, costs were developed for facilities with capacities of 0.1 mgd, 1.0 mgd, and 10 mgd, and for conveyance distances of 1,000 feet, 10,000 feet, and 50,000 feet. This array of costs, as a function of capacity and conveyance distance, was chosen to bracket the likely size ranges of potential facilities within King County.

A number of factors were added to the base capital construction costs to develop planning-level project costs: 25 percent contingency, 8.6 percent sales tax, and 35 percent engineering/legal/administration costs.

Secondary treatment capital costs were based on a base construction cost estimate for a secondary treatment plant and lift station developed from U.S. Environmental Protection Agency (EPA) cost curves. Separate estimates were calculated for the components of a tertiary treatment process, including a filtration process, a chlorination system, an alum and polymer chemical feed system, and filtration feed pumping facilities.

Distribution system components include a pump station, pipe, and storage facilities. Golf course users are assumed to have onsite ornamental ponds or water hazards for storage of reclaimed water with a point of delivery water pressure near 0 psig. Pipelines that would deliver reclaimed water to golf courses were sized to meet peak-day demands. Storage is provided at the satellite reclamation facilities for non-golf course applications; pipelines are sized to meet peak-hour demands with a water pressure at the point of delivery of 20 psig. The exception is at locations where additional storage and pumping facilities are provided at the point of delivery.

Operation and maintenance (O&M) costs are estimated by system component. For irrigation uses, it is assumed that the facility will operate for 5 months of the year.

The financial analysis consists of calculating a levelized cost, in dollars per hundred cubic feet (\$/ccf) of reclaimed water sold. The levelized cost is computed for a 35-year period at a net discount rate of 3 percent. Capital costs are paid at the beginning of year 1; however, they are financed over a 35-year period at an annual interest rate of 6.25 percent. Salvage value for capital facilities is included and is based on the assumption that pipes and structures have a 75-year useful life. O&M costs are paid in years 2 through 50. The levelized cost is computed by dividing the volume of water produced for the 35-year period by the water sales volume for the 35-year period.

Potential Funding Mechanisms

Grants and low-interest-loan monies from state and federal sources were identified as potential funding sources for financing reclaimed water projects. There are a number of agencies that offer funds based on specific criteria. The likelihood of KCDNR obtaining funding for water reuse projects will vary depending on project elements and the status of funds and eligibility requirements at the time of submittal. Table 3-2 presents a listing of the funding mechanisms. More details on each program, as well as actual applications, are presented in Appendix B. For many of the programs, there is a long lead time between the application process and the procurement of funds; therefore, it is important to plan ahead for obtaining funding.

TABLE 3-2
Potential Funding Mechanisms

| Source | Fund | Type | For Fiscal Year | Application Deadline |
|--------------------------|-------------------------------|-------------------------|-----------------|----------------------|
| Department of Ecology | Centennial Clean Water Fund | Grant/Low Interest Loan | 2002 | February 2001 |
| | State Revolving Loan Fund | Low Interest Loan | 2002 | February 2001 |
| | Section 319 | Grant | 2002 | February 2001 |
| Public Works Trust Fund | Planning Loan Program | Low Interest Loan | | Ongoing |
| | Pre-Construction Loan Program | Low Interest Loan | | October |
| | Construction Loan Program | Low Interest Loan | | May |
| Salmon Recovery Funding | Salmon Recovery Grants | Grant | | Fall |
| US Bureau of Reclamation | Title XVI | Grant | 2002 | |
| EPA | Point Source 104B3 | Grant | | Ongoing |

Steps to Implement a Generic Satellite Plant

There are essentially four phases and numerous steps within each phase required to implement a reclaimed water plant, regardless of its size or location. Table 3-3 presents an overview of the typical phases and steps necessary to implement a generic satellite plant. A complete discussion of each phase is included in Appendix B, as well as a schedule that shows the estimated time required for each step.

TABLE 3-3

Summary of Phases Required to Implement a Generic Satellite Plant

| Phase | Steps^a | Time Frame |
|--------------|---|-------------------|
| Planning | <ul style="list-style-type: none"> - Identify application and treatment sites - Initiate public involvement - Complete SEPA process - Prepare feasibility report | 12-15 months |
| Pre-Design | <ul style="list-style-type: none"> - Evaluate conveyance and treatment alternatives - Continue public involvement - Conduct risk assessment and identify operational needs - Develop cost estimates - Prepare supplemental EIS - Prepare engineering report | 9 months |
| Design | <ul style="list-style-type: none"> - Prepare contract documents - Obtain permits - Continue public involvement | 13 months |
| Construction | <ul style="list-style-type: none"> - Construction activities - Start-up, training, and commissioning - 1-year certification | 24-29 months |

^a Depending on the specifics of the satellite plant projects, the duration of some steps may vary or may be eliminated.

SECTION 4

Identification of Potential Projects

KCDNR is interested in identifying reclaimed water demonstration projects to meet the increasing demand for water supply that will be safe for public health and the environment, that will meet the needs of the communities and requirements of the Growth Management Act, that will enhance or maintain fish runs, and that will mitigate Endangered Species Act (ESA) issues. KCDNR has also identified funds to develop reclaimed water demonstration projects. A process was developed to identify and rank potential water reuse projects that would meet the goals of the Demonstration Phase. The identified potential reuse projects are described in the following sections.

Request for Project Nominations

To evaluate the region's need for and ability to support water reclamation demonstration plant(s), KCDNR has used a variety of methods to identify potential reclaimed water users. One method has been to solicit project nominations from potential reclaimed water users in King County. The process was titled "Request for Project Nominations (RFN)." The RFN process involved sending out questionnaires to interested parties to gather information on water use and water rights to determine the potential for using reclaimed water in appropriate non-potable applications. To analyze the responses to the RFN, KCDNR developed evaluation criteria to screen potential application sites. Based on the number and/or volume of use for the application sites, the most likely areas able to support a satellite demonstration plant were then identified.

The criteria were developed iteratively. Two levels of criteria were developed initially. The first level was termed "threshold criteria," which were used in the initial screening for potential application sites. The threshold criteria included the following:

- Source and user identified
- Minimum use of 1 mgd annual average
- Realistic chance of implementation by 2005

The second level of criteria was termed "second-tier criteria," which were used to evaluate the application sites that passed the first screening of threshold criteria. The second-tier criteria were grouped into the following categories:

- Regulatory
- Community/Stakeholder
- Financial
- Other

After the Task Force reviewed the evaluation process presented above, revisions were made that divided the application site evaluation process into two phases. The first phase included basic project information and the evaluation criteria that would be used to screen potential application sites. After an initial screening was complete, a feasibility assessment,

which took into account the location of a potential satellite demonstration plant, was conducted in the second phase.

The project information requested in the RFN included basic data such as the sponsoring agency/entity, location and need for the project, and associated water rights, if applicable, and project objectives. The second-tier criteria incorporated the previously proposed threshold criteria (source and use, volume, schedule, cost) and other considerations, but elaborated with a request for detailed information in each of the categories. Copies of Attachments 1 and 2 of the RFN, which include the evaluation criteria, are presented in Appendix C.

An information event was held during the RFN process that allowed interested nominators to ask questions and seek clarification on KCDNR's goals and on the overall selection process. A list of frequently asked questions is included in Appendix C.

Summary of Initial Potential Projects

As a result of the RFN process, KCDNR received responses from 11 applicants representing 13 projects/areas within King County. Using the data provided in the responses, KCDNR performed an initial screening and presented a list of projects to be considered for ranking and consideration in the next feasibility evaluation phase. The following section summarizes the RFN responses, the initial screening, and the resulting candidates for demonstration projects. The complete and detailed information on each applicant/use and the evaluation process of potential projects is included in Appendix C.

The 11 RFN responses received by KCDNR are summarized in Table 4-1. The information presented is based solely on information provided by potential reclaimed water users in each RFN package. The projects are summarized by the organizations that submitted the packages.

After reviewing the initial RFN packages, KCDNR eliminated several projects from further consideration in the demonstration project phase. For example, the Sammamish Plateau Water and Sewer District proposal was to examine water reuse as a tool for streamflow augmentation. This proposal will be examined as part of a later phase of the Reclaimed Water Program when policies on streamflow augmentation will be discussed. The proposals from Tukwila and the University of Washington are considered ongoing as part of different regional reuse projects and will be considered separately from this process.

The remaining nominations were grouped into five potential demonstration projects based on their proximity to a potential reclaimed water source and on the estimated volume of reclaimed water that might be available. The five projects are:

- Sammamish River (from Redmond to Woodinville)
- North Sammamish River (the Bothell-Kenmore area)
- The Golf Club at Newcastle and Mutual Materials Co. (south of Bellevue)
- Covington
- Tam O'Shanter Golf Course (in Bellevue)

TABLE 4-1
Summary of RFN Packages Submitted

| Applicant/Project | Location^a | Acreage^b | Current Water Source | Primary Reclaimed Water Use |
|--|-----------------------------|----------------------------|--|--|
| Willows Run Golf Course | Redmond | 300 | Sammamish River | Seasonal irrigation |
| Molbak's Greenhouse | Redmond | 42 | Onsite Wells | Irrigation |
| Woodinville Water District | | | | |
| JB Instant Lawn | Redmond | 250 | Sammamish River | Seasonal irrigation |
| Gold Creek Park | Redmond/ Woodinville | 100 | Woodinville WD | Seasonal irrigation |
| Shoreline Water District | | | | |
| York Pumping Station Area | Redmond/ Woodinville | -- | Sammamish River, Woodinville WD | Streamflow augmentation |
| North Creek Area | Kenmore/ Bothell | -- | Woodinville WD | Seasonal irrigation of campus, ballfields and commercial areas |
| Northshore Utility District | | | | |
| Kenmore Small Users | Kenmore/ Bothell | -- | Northshore UD | Seasonal irrigation of schools |
| Golf Club at Newcastle/Mutual Materials Co. | Newcastle/ Bellevue | 100 | Coal Creek UD | Seasonal irrigation and process water |
| Covington Water District | Covington/ Auburn | 100-133 | Covington WD, City of Auburn, Onsite Wells | Seasonal irrigation of schools, parks and golf courses |
| Tam O'Shanter Golf Course | Bellevue | 100 | City of Bellevue | Seasonal irrigation |
| Sammamish Plateau Water and Sewer District | Issaquah | -- | Sammamish Plateau WSD | Streamflow augmentation |
| University of Washington | Seattle | 100 | City of Seattle | Seasonal irrigation of campus |
| City of Tukwila | Tukwila | -- | Tukwila WD | Process water |

^a See Figures 4-1 through 4-6 for specific project location. Some of the sites are located officially in Unincorporated King County.

^b Acreage was estimated, where possible, if it was not provided in the RFN packages.

Table 4-2 demonstrates how the projects were grouped for the subsequent evaluation.

TABLE 4-2
Grouping of RFN Packages into Final Projects

| RFN Package | Sammamish River | North Sammamish River | Newcastle | Covington | Tam O'Shanter | On Hold |
|--|-----------------|-----------------------|-----------|-----------|---------------|----------------|
| Willows Run Golf Course | X | | | | | |
| Molbak's Greenhouse | X | | | | | |
| Woodinville Water District | X | | | | | |
| Shoreline Water District (1) | X | | | | | X ^a |
| Shoreline Water District (2) | | X | | | | |
| Northshore Utility District | | X | | | | |
| Golf Club at Newcastle | | | X | | | |
| Covington Water District | | | | X | | |
| Tam O'Shanter Golf Course | | | | | X | |
| Sammamish Plateau Water and Sewer District | | | | | | X ^a |
| University of Washington | | | | | | X |
| City of Tukwila | | | | | | X |
| Other Redmond / Woodinville Users | X | X | | | | |
| Other Kenmore / Bothell Users | | X | | | | |
| Other Covington/Kent Users | | | | X | | |

^a The streamflow augmentation portion of the proposal may be considered in future phases of the Reclaimed Water Program.

The Covington project was listed as a project and included in the process; however, during the subsequent evaluation, it was determined that there were insufficient wastewater flows available at the facilities indicated in the RFN to meet the reclaimed water needs of the Covington project. The project remained in the process in order to establish base line parameters for comparison purposes and in the event that additional wastewater sources or volumes would be available in the future.

In addition to the RFN nominations received, KCDNR identified other users associated with the Sammamish River, North Sammamish River, and Covington projects that may be potential candidates for reclaimed water use. These sites include Marymoor Park in Redmond; Chateau Ste. Michelle Winery, Farm LLC, and Hmong Farm in Woodinville; the Wayne and Inglewood Golf Courses in Bothell/Kenmore; and numerous golf courses in the Covington/Kent area. These projects were incorporated into the evaluation process used to rank the five potential reuse projects.

Once the initial RFN packages had been reviewed and the five potential projects compiled and developed, a memorandum summarizing the evaluation process and results was sent to each of the RFN applicants. KCDNR then met with a number of the interested RFN applicants to discuss the process and confirm the assumptions that had been made. As a result of the meetings, KCDNR received letters from the Shoreline Water District, Northshore Utility District, and representatives of The Golf Club at Newcastle/Mutual Materials Co. Comments received from the Shoreline Water District and Northshore Utility District did not result in changes to the evaluation assumptions. However, modifications were requested and incorporated into the subsequent project-specific evaluation for The Golf Club at Newcastle/Mutual Materials Co. project.

Summary of Subsequent Potential Projects

After the first round of project evaluations, the recommendation in the *Reclaimed Water Program Demonstration Phase: Identification of Potential Satellite Projects for Direct Non-Potable Uses – Draft Report* (July 2000), was to add two new water reuse projects to the overall evaluation. A further recommendation from the Task Force was to reduce the size of a previously evaluated project to decrease overall costs. The additional projects and the revised project were:

- Include reclamation facilities at the proposed future regional wastewater treatment plant (North Treatment Plant) for the Sammamish River and North Sammamish River users
- Construct either a water reuse satellite plant in the Auburn/Kent area or additional reuse facilities at KCDNR's existing South Treatment Plant at Renton to provide reclaimed water to identified users in the Auburn/Kent Valley (Auburn/Kent Valley).
- A scaled-down version of the proposed Sammamish River Water Reuse project in an effort to decrease capital costs to be consistent with the RWSP cost assumptions (Modified Sammamish River).

A brief summary of each of the three projects is presented below. More details can be found in Technical Memoranda AWSA-100, 110, and 200 located in the Appendices.

The North Treatment Plant project is dependent on the siting of a proposed future regional wastewater treatment plant in northern King County or southern Snohomish County. The siting study is ongoing and potential plant locations are currently being identified and evaluated. For the evaluation of serving Sammamish River and North Sammamish River reuse sites from the North Treatment Plant, an analysis was conducted to determine a range of distances where the proposed plant could be located and still meet the economic criteria (as discussed in Section 6). It was assumed that tertiary treatment would be added to the proposed secondary treatment plant. The project was sized to meet the water reuse needs of identified users in the Sammamish River and North Sammamish River area, see Table 4-3.

Two Auburn/Kent Valley projects were included in the evaluation. The first assumed that a satellite plant was located within the valley to provide reclaimed water for irrigation to a number of agricultural areas, golf courses, parks, and nurseries. The second project assumed that the water reuse facilities were expanded at the existing South Treatment Plant

at Renton and conveyed south to identified users in the Auburn/Kent Valley. Because the capital costs were lower and there were no limitations on reclaimed water volumes available, the Auburn/Kent Valley project that expands the reclamation facilities at the South Treatment Plant is the project that has been included in this summary document.

A subsequent request from members of the Task Force was to decrease the size of the Sammamish River project to minimize the estimated capital cost and keep those costs below \$20 million. This figure is consistent with the RWSP which stated that a \$20 million net present value was the estimated cost to evaluate potential future water reuse opportunities. The revised project is named the Modified Sammamish River Water Reuse Project. The satellite plant capacity was reduced and the number of potential users decreased to meet the new project criteria.

Project Elements and Costs

Because nearly all of the potential application sites are summer irrigation users (i.e., golf courses, parks, and agricultural areas), it was assumed that all of the facilities would operate only during the irrigation season, which was estimated to be May through September. The reclaimed water facilities would draw raw wastewater from the identified sewer system for full-process liquid stream treatment to produce Class A reclaimed water suitable for reuse. Resultant wastewater solids would be reintroduced into the sewer system for conveyance and treatment at KCDNR's regional wastewater treatment plants.

To locate a site for the reclaimed water treatment plant, an analysis was conducted to determine the available flows in the existing interceptors. The volume of wastewater in the interceptor was required to be equal to or greater than the estimated reclaimed water demand. There also had to be an adequate volume of wastewater remaining in the pipe to convey solids produced at the reclamation plant. The requirement for this additional flow is that it must have a minimum carrying velocity of 2.5 feet per second to prevent solids from settling out in the pipelines.

To size the treatment facilities, the reclaimed water demands were estimated for each of the users in the five potential projects. Actual water demand figures for a number of the users were not provided in the RFN. In those cases, the operating conditions used to size and evaluate each facility were estimated using peaking factors, data from other users (*Refine Alternatives for Effluent Reuse at the Blakely Ridge/Northridge Mater Plan Developments*, CH2M HILL, 1993), and agronomic rates from the State of Washington Irrigation Guide. These assumptions are described in detail in Appendix C.

Table 4-3 lists the potential users identified for this evaluation, the potential locations of each satellite treatment plant, and the estimated reclaimed water demand of each user.

TABLE 4-3
Reclaimed Water Flow Demand

| Potential Satellite Plant Location | Potential Users | Average Day ^{a,b} (mgd) | | | PDD ^{c,d} (mgd) | PHD ^{e,f} (gpm) |
|---|---|----------------------------------|-------|-------|-----------------------------|-----------------------------|
| | | Min | Max | Avg | | |
| York Pumping Station (Sammamish River) | | | | | | |
| | Willows Run Golf Course | 0.332 | 1.283 | 0.808 | 1.27 | 2,198 |
| | Farm LLC | | | 0.201 | 0.31 | 516 |
| | 60 Acres Soccer Field | | | 0.171 | 0.26 | 439 |
| | Molbak's Greenhouse | | | 0.026 | 0.04 | 67 |
| | JB Instant Lawns | | | 1.072 | 1.65 | 2,751 |
| | Hmong Farm | | | 0.201 | 0.31 | 516 |
| | Chateau Ste. Michelle Winery | | | 0.342 | 0.53 | 878 |
| | Gold Creek Parks | | | 0.107 | 0.16 | 274 |
| York Pumping Station (Modified Sammamish River) | | | | | | |
| | Willows Run Golf Course | 0.332 | 1.283 | 0.808 | 1.27 | 2,198 |
| | 60 Acres Soccer Field | | | 0.171 | 0.26 | 439 |
| | JB Instant Lawns | | | 1.072 | 1.65 | 2,751 |
| Kenmore Pumping Station (North Sammamish River) | | | | | | |
| | Wayne GC | | | 0.427 | 0.66 | 1,100 |
| | Inglewood Country Club | | | 0.427 | 0.66 | 1,100 |
| OKI Development land parcel (Newcastle) | | | | | | |
| | The Golf Club at Newcastle / Mutual Materials Co. ⁹ | | | 0.5 | 0.5 | 833 |
| Covington Pumping Station (Covington) | | | | | | |
| | Covington Water District ^h | | | 0.5 | 0.5 | 833 |
| 148th Ave NE & NE 8th Street (Tam O'Shanter) | | | | | | |
| | Tam O'Shanter Golf Course | 0.150 | 0.427 | 0.289 | 0.44 | 741 |
| North Treatment Plant | | | | | | |
| | Willows Run Golf Course | 0.332 | 1.283 | 0.808 | 1.27 | 2,198 |
| | Farm LCC | | | 0.201 | 0.31 | 516 |
| | 60 Acres Soccer Field | | | 0.171 | 0.26 | 439 |
| | Molbak's Greenhouse | | | 0.026 | 0.04 | 67 |
| | JB Instant Lawns | | | 1.072 | 1.65 | 2,751 |

TABLE 4-3
Reclaimed Water Flow Demand

| Potential Satellite Plant Location | Potential Users | Average Day ^{a,b} (mgd) | | | PDD ^{c,d} (mgd) | PHD ^{e,f} (gpm) |
|--|---|----------------------------------|-----|-------|-----------------------------|-----------------------------|
| | | Min | Max | Avg | | |
| | Hmong Farm | | | 0.201 | 0.31 | 516 |
| | Chateau Ste. Michelle Winery | | | 0.342 | 0.53 | 878 |
| | Gold Creek Parks | | | 0.107 | 0.16 | 274 |
| | Wayne Golf Course | | | 0.427 | 0.66 | 1,100 |
| | Inglewood Country Club | | | 0.427 | 0.66 | 1,100 |
| Green River and Auburn Interceptor (Auburn/Kent Valley) | | | | | | |
| West of SR167 | Pastures and crops along the West Valley Hwy, south of SR516 | | | 1.66 | 2.68 | 1,861 |
| | Pastures and crops south of S. 277th Street | | | 0.33 | 0.54 | 375 |
| | Tree Farm North of SR516 | | | 0.03 | 0.05 | 35 |
| | Riverbend Golf Course | | | 0.63 | 0.97 | 674 |
| | Russel Road Park | | | 0.09 | 0.14 | 229 |
| | Nursery along Frager Road | | | 0.06 | 0.0983 | 63 |
| East of SR167 | Pastures and crops bordered by the Green River to the east and S. 277th Street to the south | | | 0.88 | 1.41 | 979 |
| | North Green River Park | | | 0.04 | 0.07 | 118 |
| | Green River Nursery | | | 0.01 | 0.02 | 14 |
| | Pastures and crops between I Street and the Green River | | | 0.25 | 0.40 | 278 |
| | Auburn Regional Golf Course | | | 0.72 | 1.10 | 764 |

^a During irrigation period (May-September)

^b Average day demand estimated from agronomic rates in Washington State. For crops and pastures, an average irrigation rate of 0.33 mgd/100 acres is used, based on irrigation data for potatoes, corn fields, berries, and turf crops.

^c Peak-day demands (PDD) of non-agricultural uses are based on applying a 1.54 peaking factor to the average value of average-day-demand. Peaking factor calculated based on agronomic rates.

^d PDD of crops and pastures are based on applying a 1.612 peaking factor to the average value of average day demand.

^e Assumes a peak-hour demand (PHD) factor of 2.4 for non-agricultural uses. PHD/PDD based on assumption of 10 hours of irrigation per day.

^f For agricultural irrigation, a peaking factor of 1.00 PHD/PDD is used based on 24 hours of irrigation per day.

^g At the request of representatives from the Golf Club at Newcastle, plant capacity is to be limited to 0.5 mgd for both average and peak-day flows. Existing 3 MG storage ponds at the golf course are to be used for peaking purposes.

^h RFN restricted the initial plant capacity to 0.5 mgd.

Figures 4-1 through 4-8 show the proposed locations of the potential satellite treatment facilities and the proposed application sites.

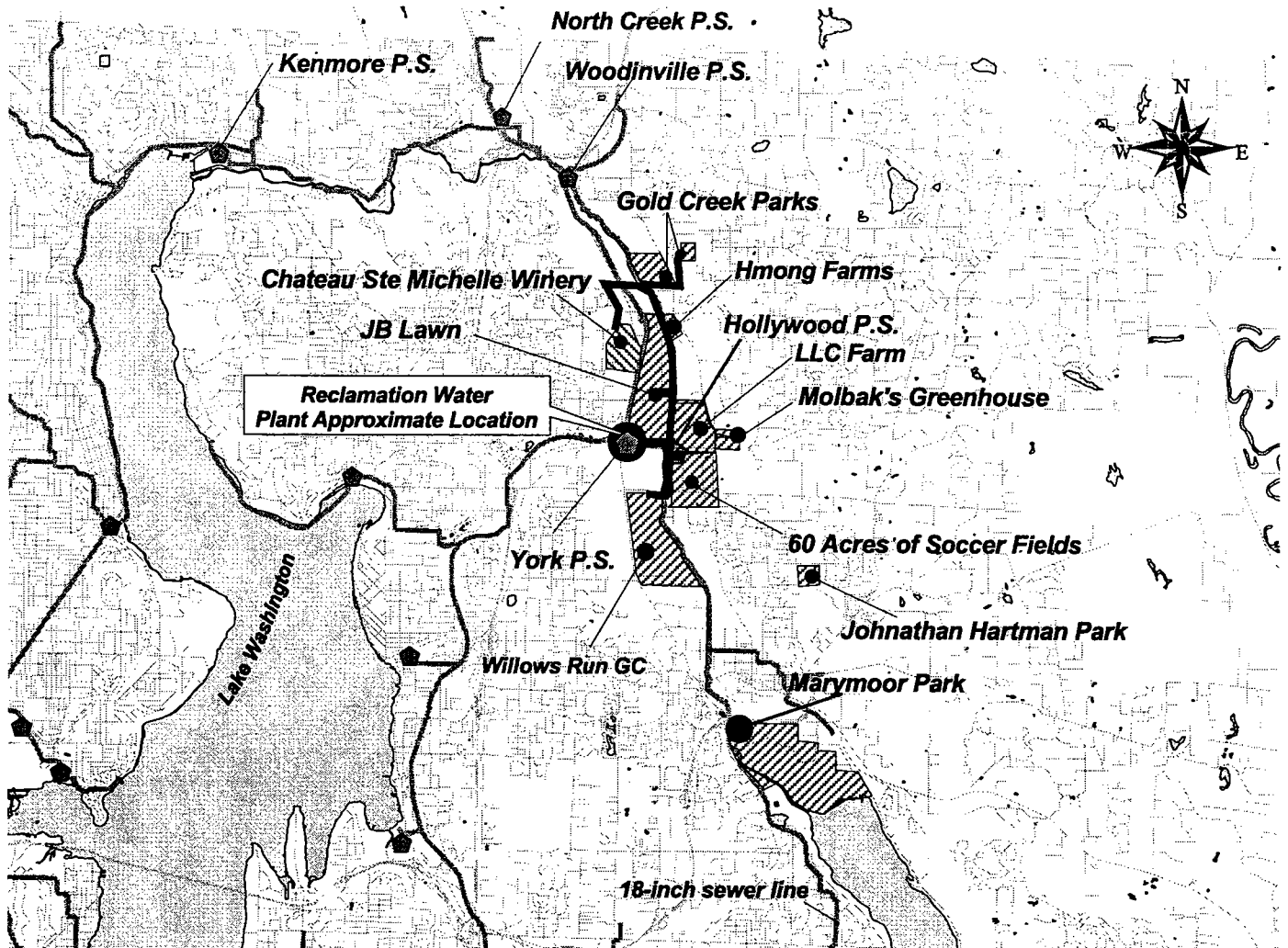
To support the subsequent ranking process, preliminary cost estimates were developed for each of the potential demonstration projects. Project capital costs were estimated for secondary treatment, tertiary treatment, and distribution facilities. No solids handling facilities were included.

The feasibility of each project was then assessed and the projects were compared on the basis of a preliminary unit cost of reclaimed water produced. The design criteria, assumptions, and factors used in the preliminary cost evaluation are discussed in Appendix C. Table 4-4 presents a summary of the cost data that were developed.

The production cost per hundred cubic foot of reclaimed water varies between \$4.01 and \$10.33. The estimated distribution length and seasonal operation of the facilities have a large impact on these unit costs. As a means of comparison, potable water rates charged to large irrigation users by utilities in the general project areas range from \$2.04 to \$4.28/ccf. Seattle Public Utilities' current peak summer marginal cost is \$2.41/ccf.

Figure 4-1

Reclaimed Water Project Evaluation: Sammamish River








-  Pumping Stations
-  KC Sewers
-  Streets
-  Proposed Reclamation Pipeline
-  User Area

Figure 4-2

Reclaimed Water Project Evaluation: Modified Sammamish River

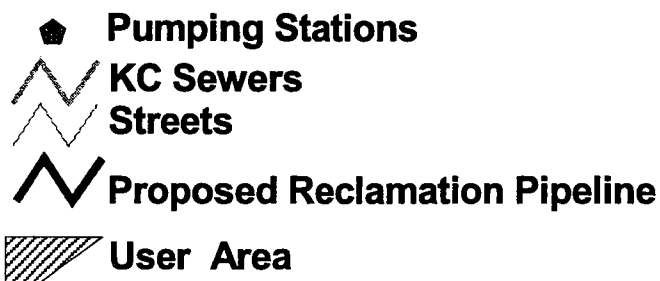
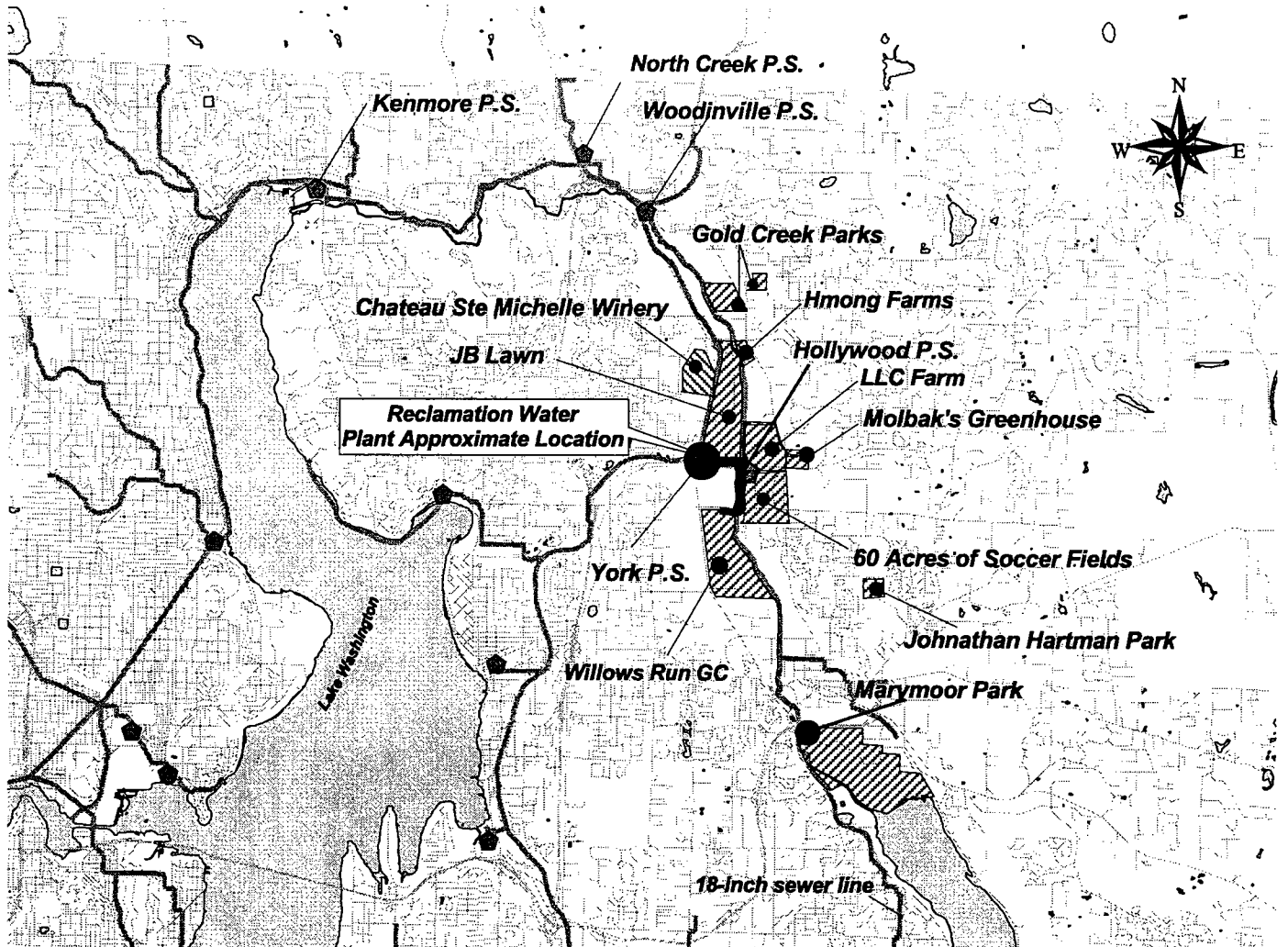


Figure 4-3

Reclaimed Water Project Evaluation: North Sammamish River

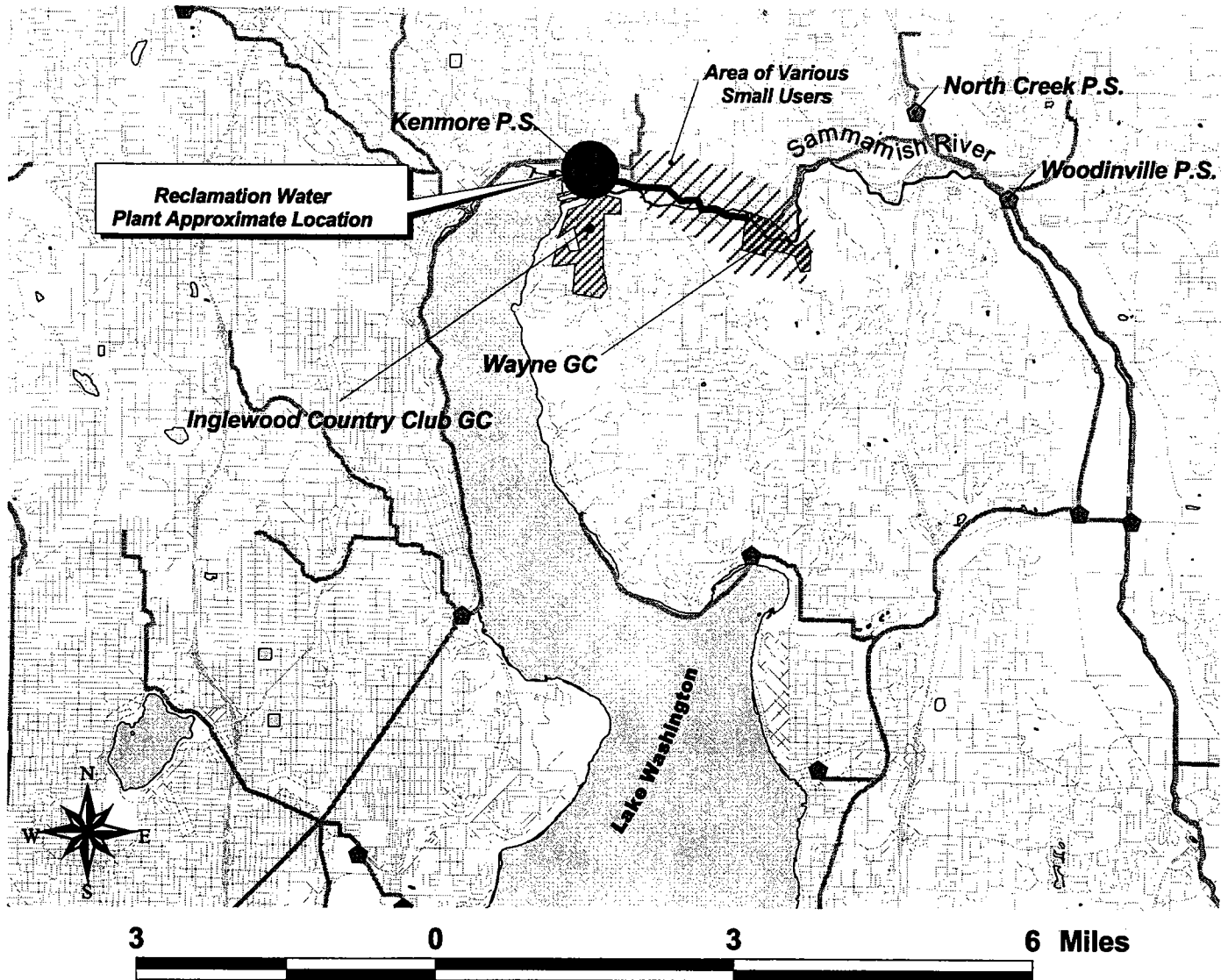
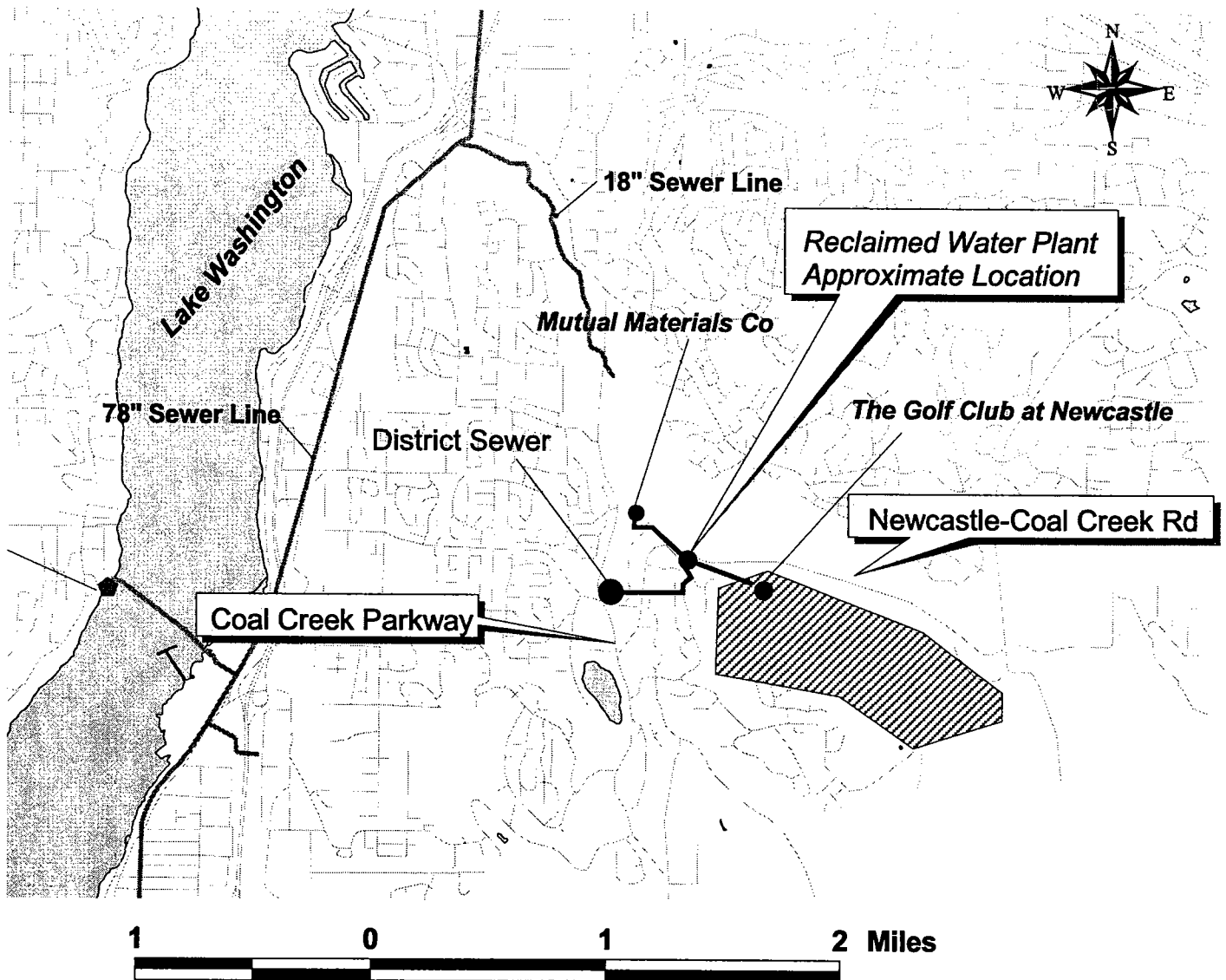


Figure 4-4

Reclaimed Water Project Evaluation: Newcastle








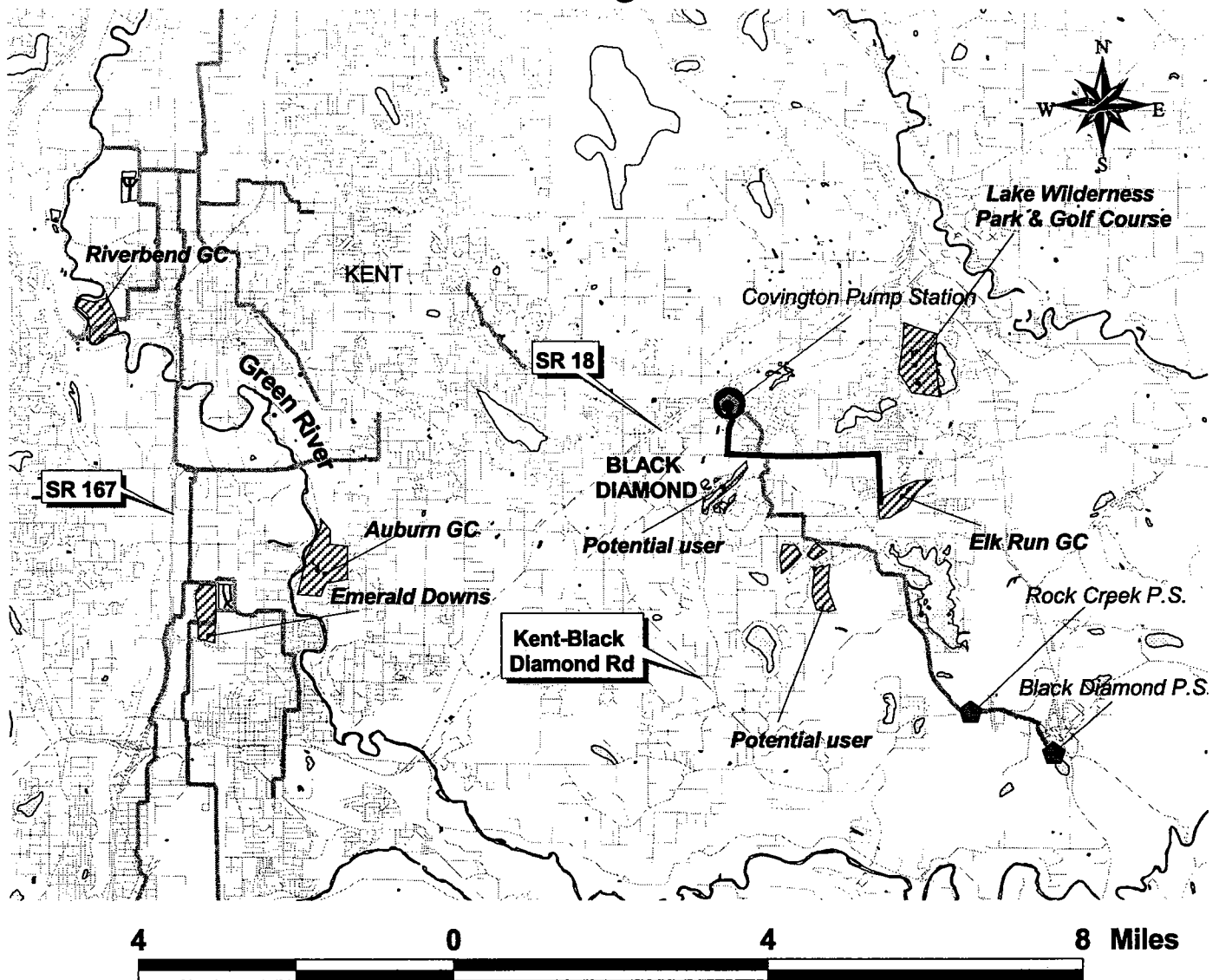
-  **Pumping Stations**
-  **KC Sewers**
-  **Streets**
-  **Proposed Reclamation Pipeline**
-  **User Area**

Figure 4-5

Reclaimed Water Project Evaluation: Covington








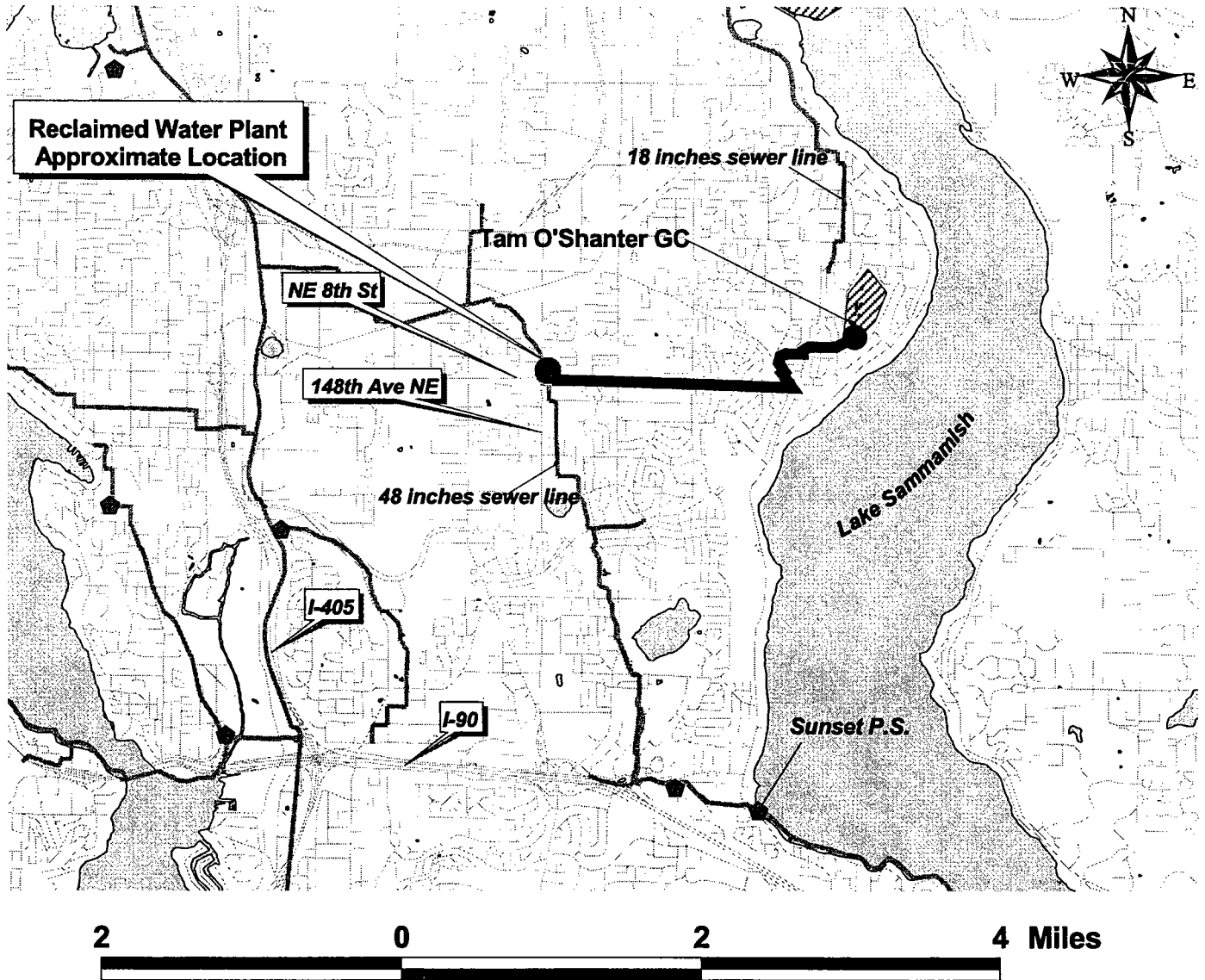
-  **Pumping Stations**
-  **KC Sewers**
-  **Streets**
-  **Proposed Reclamation Pipeline**
-  **User Area**

Figure 4-6

Reclaimed Water Project Evaluation: Tam O'Shanter








-  Pumping Stations
-  KC Sewers
-  Streets
-  Proposed Reclamation Pipeline
-  User Area

Figure 4-7

Reclaimed Water Project Evaluation: North Treatment Plant

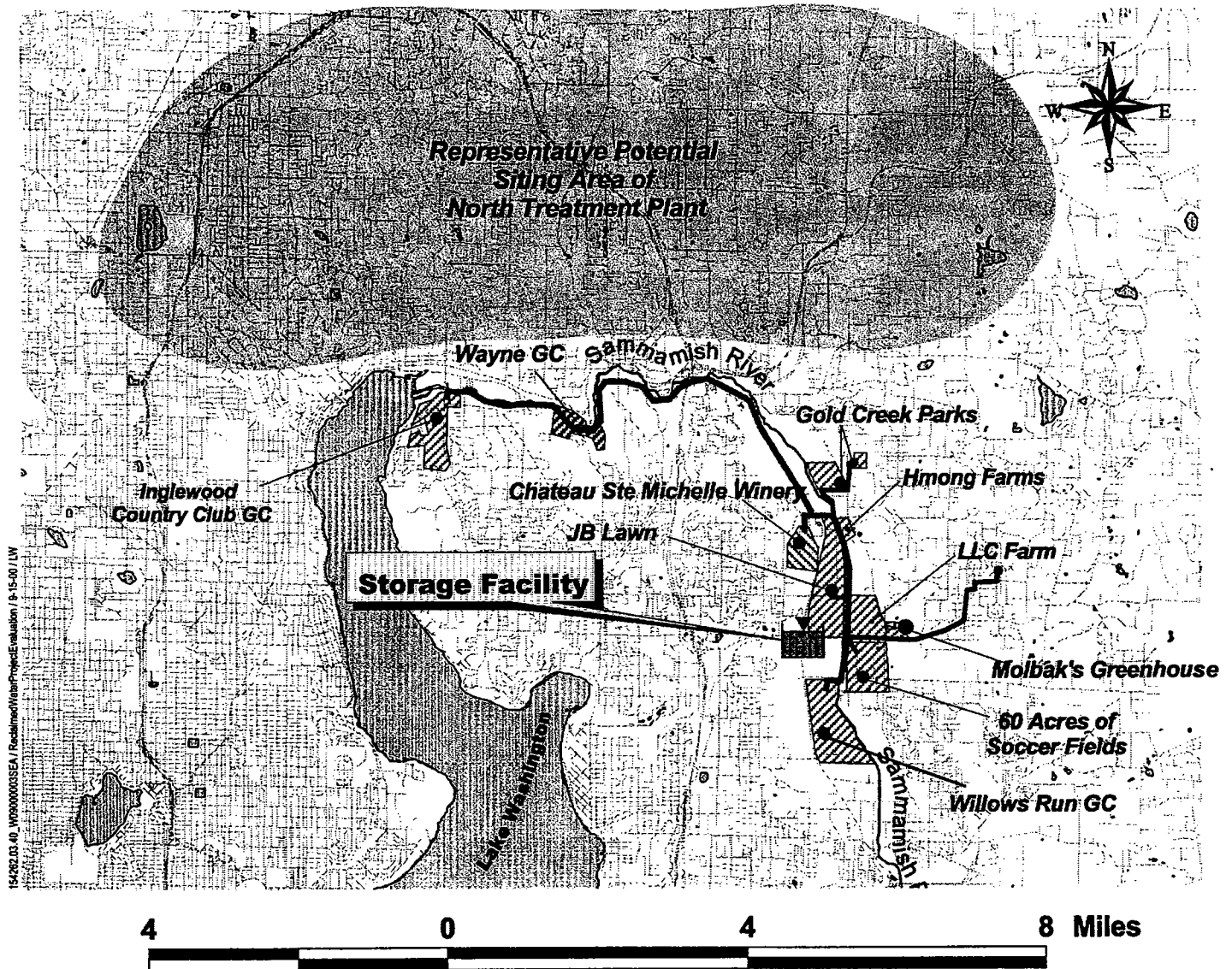
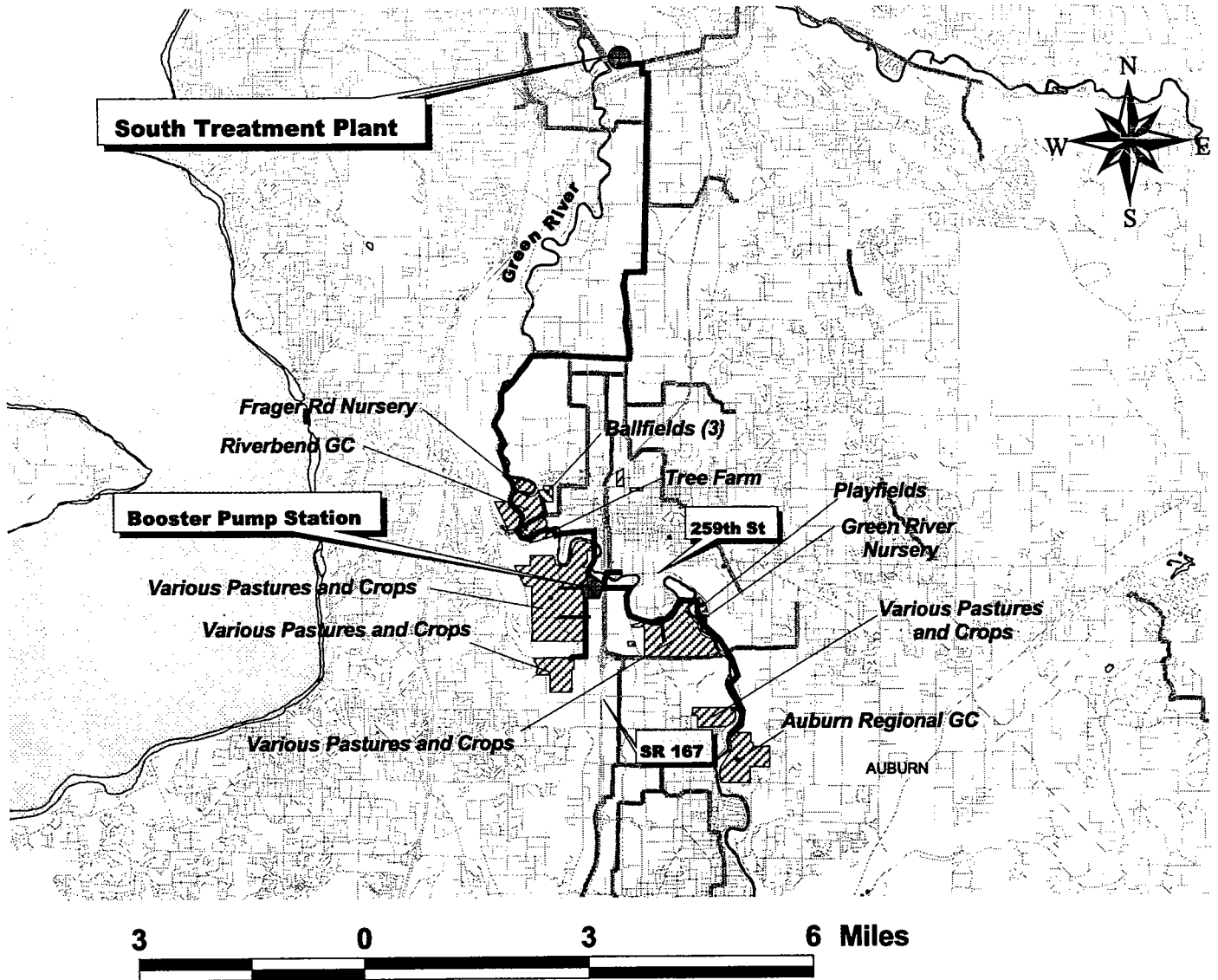


Figure 4-8

Reclaimed Water Project Evaluation: Auburn/Kent Valley







-  Streets
-  KC Sewers
-  Proposed Reclamation Pipeline
-  User Area

TABLE 4-4
Preliminary Costs for Potential Demonstration Projects

| Cost Category | Sammamish River | Modified Sammamish River | North Sammamish River | Newcastle | Covington | Tam O'Shanter | North Treatment Plant | Auburn/Kent Valley ^g |
|--|---------------------------|---------------------------|---------------------------|--------------|--------------|---------------|-----------------------|---------------------------------|
| Reclamation Plant Design Capacity (mgd) ^a | 4.53 | 3.18 | 1.32 | 0.5 | 0.5 | 0.44 | 5.86 | 7.5 |
| Reclaimed Water Delivered, MG/Irrigation Season ^h | 436 | 290 | 98 | 74 | 74 | 49 | 534 | 647 |
| Project Capital Costs ^b | \$43,562,000 ^c | \$30,520,000 ^c | \$17,471,000 ^c | \$10,225,000 | \$11,124,000 | \$11,029,000 | \$25.1M to \$31.2M | \$38,300,000 |
| Operation and Maintenance ^d | \$552,000 | \$409,000 | \$241,000 | \$175,000 | \$166,000 | \$141,000 | \$348,000 - \$401,000 | \$480,000 |
| Levelized Unit Production Costs (\$/ccf) ^e | \$4.01 | \$4.08 | \$5.65 | \$5.98 | \$6.26 | \$10.33' | \$1.84 to \$2.19 | \$2.32 |

^a Based on average irrigation demand during five months (May – September) of operation per year

^b Assumes contingency (25%), Sales tax (8.6%), Engr./Legal/Admin. (35%)

^c Assumes the use of the existing pumping station equipment. If a complete new package lift station is needed, capital costs will increase.

^d At full operating capacity. Includes pipe and pump maintenance costs, power costs with 75% efficiency, storage tank maintenance costs and chemical costs

^e Levelized unit cost calculated as ratio of total annual costs over the total ccf of reclaimed water produced over the 35-year cycle

^f The unit cost of Tam O'Shanter is substantially higher than the unit cost for Covington, even though the capital and O&M costs are similar. This is because the unit cost is calculated based on the average flow, and Covington's average and peak flow are the same since there many more users identified than there was water available.

^g The Auburn/Kent Valley project (via the South Treatment Plant at Renton) does not include any potential users/application sites along the transmission main through the City of Kent.

^h Based on estimated irrigable acreage.

SECTION 5

Identification of Alternative Water Supply Concepts

To ensure that the water reuse project(s) ultimately chosen to represent the Demonstration Phase not only meets the goals of the program, but is also sensible and realistic, KCDNR has expanded the evaluation beyond the limits of reclaimed water to explore other potential water sources. The requirements are that the alternative water supply concepts must meet the same non-potable applications during the May to September irrigation season and the application sites must be located in the Sammamish River and North Sammamish River areas. The expanded evaluation is not intended to identify alternative water sources for the users in these areas, but is rather another means to compare and assess potential water reuse projects.

Summary of Potential Alternative Water Supply Concepts

Five potential alternative water supply concepts were originally considered (a sixth project was the North Treatment Plant water reuse project which has been discussed previously in Section 4). However, after a preliminary evaluation, it was determined that two of the concepts, increasing storage in Lake Sammamish and transferring water from Lake Washington, contained 'fatal flaws' and were eliminated from further consideration. A third concept, aquifer storage and recovery, was also eliminated from the evaluation process because there were too many unknowns. More detailed studies would be required to define baseline parameters before this concept could be developed further.

The remaining two potential water supply concepts were evaluated to use in comparison with water reuse options to meet the identified non-potable water demands in the Sammamish River and North Sammamish River areas. The remaining projects are as follows:

- Continuing pumping from the Sammamish River (status quo)
- Purchasing potable water from local purveyors

A brief description of each of the two projects is presented below.

Continued pumping from the Sammamish River represents the status quo or 'no alternative' project. Nearly all of the identified users are either currently withdrawing water directly from the Sammamish River or indirectly through groundwater wells. While this alternative would not change the current mode of operation, it should be noted that the validity of the water rights for many of the users is currently in question with the Washington State Department of Ecology and some of the users are actively seeking alternative sources of water. This concept has been carried forward for comparison purposes, but is not viewed as a satisfactory concept.

If the identified non-potable water users were to eliminate both surface and groundwater withdrawals, purveyors could extend water service lines from the potable water system to each of the application sites and provide potable water for irrigation. There are water purveyors with jurisdiction in the irrigation areas. Purveyors would only serve users located within their identified water service area and would charge rates applicable to irrigation use. Current rates vary from \$2.04/ccf to \$4.18/ccf.

Project Elements and Costs

Because nearly all of the potential application sites are summer irrigation users (i.e., golf courses and parks), it was assumed that each of the alternative water supply concepts would be required to provide water only during the irrigation season, which was estimated to be May through September. To determine the amount of irrigation water that would be required, the water demands were estimated for each of the users in the Sammamish River and North Sammamish area. Assumptions related to estimating water demands can be found in Appendix C.

Table 5-1 lists the potential users identified for this evaluation and the estimated water demand of each user.

TABLE 5-1
Estimated Water Demands

| Potential Users | Average Day ^a (mgd) | | | PDD ^b (mgd) | PHD ^c (gpm) | |
|------------------------------|--------------------------------|-------|-------|---------------------------|---------------------------|--|
| | Min | Max | Avg | | | |
| Sammamish River | | | | | | |
| Willows Run Golf Course | 0.332 | 1.283 | 0.808 | 1.27 | 2,198 | |
| Farm LLC | | | 0.201 | 0.31 | 516 | |
| 60 Acres Soccer Field | | | 0.171 | 0.26 | 439 | |
| Molbak's Greenhouse | | | 0.026 | 0.04 | 67 | |
| JB Instant Lawns | | | 1.072 | 1.65 | 2,751 | |
| Hmong Farm | | | 0.201 | 0.31 | 516 | |
| Chateau Ste. Michelle Winery | | | 0.342 | 0.53 | 878 | |
| Gold Creek Parks | | | 0.107 | 0.16 | 274 | |
| North Sammamish River | | | | | | |
| Wayne GC | | | 0.427 | 0.66 | 1,100 | |
| Inglewood Country Club | | | 0.427 | 0.66 | 1,100 | |

^a During irrigation period (May-September)

^b Peak-day demands (PDD) are based on applying a 1.54 peaking factor to the average value of average-day-demand. Peaking factor calculated based on agronomic rates.

^c Assuming a peak-hour demand (PHD) factor of 2.4. PHD/PDD based on assumption of 10 hours of irrigation per day.

Figure 5-1 shows a schematic for the required systems to convey potable water to each of the identified users.

To support the subsequent ranking process, preliminary capital cost, and operation and maintenance cost estimates were developed for each of the potential alternative water supply concepts. The feasibility of the concepts were then assessed and presented in terms of a unit cost of water produced for direct comparison with the water reuse projects described in Section 4. The design criteria, assumptions, and factors used in the preliminary cost evaluation are discussed in Appendix C. Table 5-2 presents a summary of the cost data.

TABLE 5-2
Preliminary Costs of Alternative Water Supply Concepts

| | Continued Pumping on the Sammamish River (status quo)^a | Purchase Potable Water from Local Purveyors |
|--|--|--|
| Project Capital Costs ^b | ---- | \$2,358,000 |
| Operation and Maintenance ^c | --- | \$2,156,000 |
| Levelized Unit Costs (\$/ccf) ^d | --- | \$2.91 |

^a No new facilities required for this concept. KCDNR would experience no capital costs; each property owner would be responsible for maintaining the current conveyance facilities as appropriate.

^b Assumes contingency (25%), sales tax (8.6%), and engineering/legal/administration (35%).

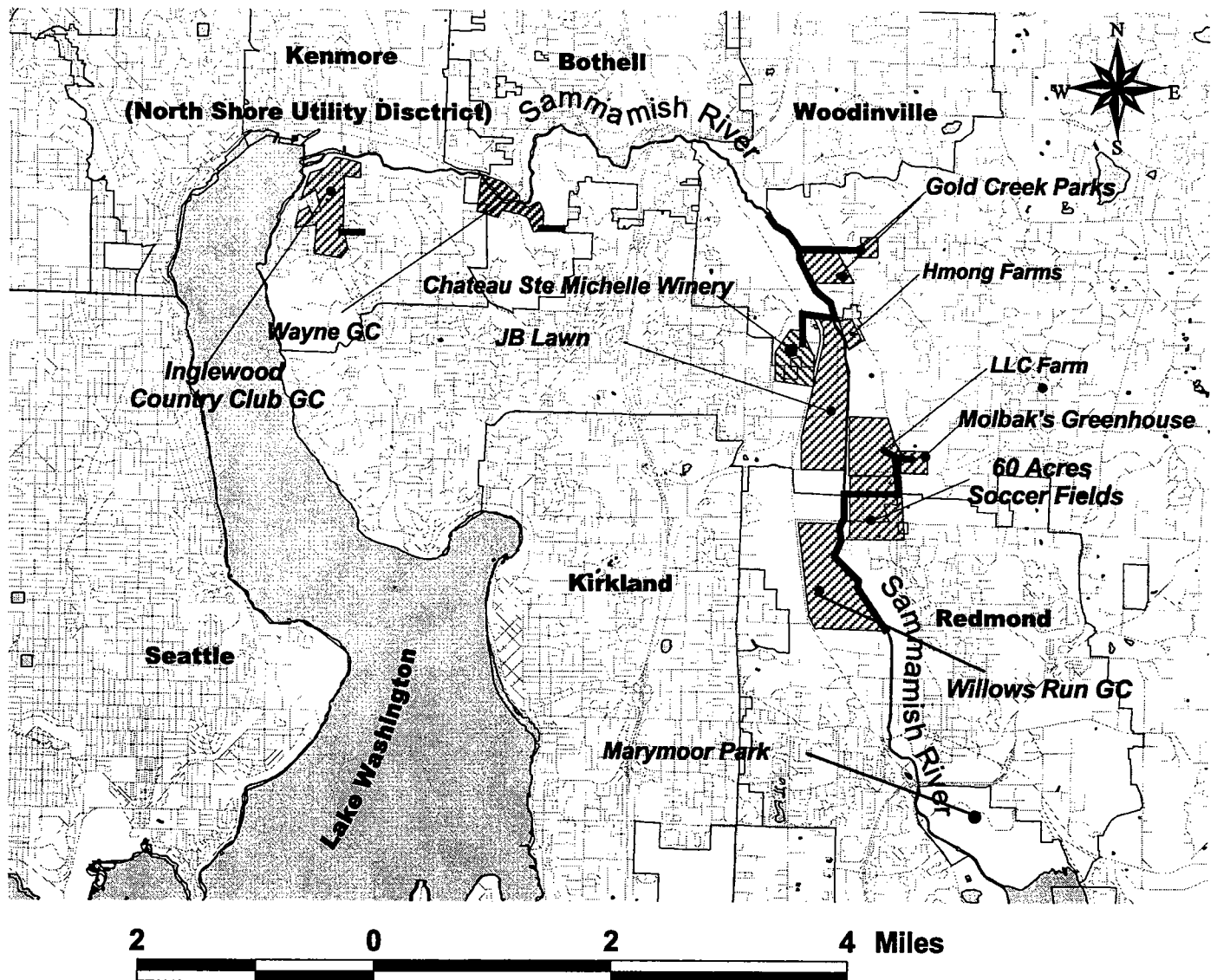
^c Includes pipe and pump maintenance costs, power costs with 75% efficiency, storage tank maintenance costs, and chemical costs.





^d Levelized unit cost calculated as ratio of total annual costs over the total ccf of reclaimed water produced over the 35-year cycle

The cost per hundred cubic feet to purchase potable water from local purveyors varies between \$1.88 to \$3.37. The \$2.91/ccf presented in Table 5-2 is a weighted average as a function of volume of water delivered. As a means of comparison, potable water rates charged to large irrigation users by utilities in the general project areas range from \$2.04 to \$4.28/ccf. Seattle Public Utilities sells summertime peak new water to its wholesale customers at \$2.41/ccf.

Figure 5-1

Purchasing Potable Water from Local Purveyors



-  Distribution Pipeline
-  Jurisdiction Boundaries
-  User Area
-  Streets

SECTION 6

Ranking of Potential Projects

To determine which of the potential demonstration projects would proceed into the subsequent feasibility assessment phase, evaluation criteria were defined and used to rank the projects. The two alternative water supply concepts (continued pumping from the Sammamish River and purchase potable water from local purveyors) were also included for comparison purposes. The original evaluation criteria developed by KCDNR and broken into four major categories are as follows:

- Regulations – Water rights, environmental issues, permits, and associated plans
- Community/Stakeholder – Impacts, local support, and stakeholder benefits
- Financial – Costs and funding
- Other – Coordination with KCDNR projects

Issues associated with each category were distilled into common groupings within each category as presented in Table 6-1. Later in the evaluation process, KCDNR added two additional criteria and the wording of all criteria have been modified to allow them to be applied to a variety of projects or concepts. This formed the criteria that were used as the basis for the ranking process for each potential demonstration project.

TABLE 6-1
Evaluation Criteria for Water Reuse Projects

| Regulatory | Community/Stakeholder | Financial | Other |
|---|--|-------------------------------------|---|
| Consistent with GMA, RWSP, and regional water plans | Long-term benefits to community where facilities are located | Potential for funding opportunities | Integration with other KC projects |
| Potential water rights to be offset or substituted | Minimize long-term adverse impacts | Benefit/cost evaluation | Demonstrates new 'alternative' technologies in water and wastewater |
| Enhances streamflows directly or indirectly | Local public and elected official support | Unit cost for water produced | |
| Beneficial to water bodies identified as "low flows" or with endangered salmon listings | Benefits multiple stakeholders | | |
| Liability or health issues | | | |
| Legal constraints | | | |
| Construction-related environmental impacts | | | |
| Timeliness of permits | | | |

For each evaluation criteria shown in Table 6-1, definitions were developed that listed what represented a "favorable" - ●, "neutral" - ◐, or "less favorable" - ○ ranking. In addition to those three rankings, a "not enough information" - ⊗ ranking was developed for cases where available information was insufficient to make a determination. Representatives from the consultant team evaluated each of the projects according to the specific criteria and ranked each one. The information used to perform the evaluations was based on information developed in the applicable technical memoranda included in Appendix D. Table 6-2 presents the specific criteria definitions for each ranking.

Appendix D contains a complete discussion of the evaluation ranking process and the rationale for the rating applied to each potential demonstration project. At the end of this section, Table 6-3 presents the overall summary of the ranking within each category.

The intention of the evaluation was to rank the potential reuse projects and compare them with the alternative water supply concepts, as well as between the individual reuse projects, within the four identified categories. This would then allow KCDNR to make a documentable and defensible decision about which projects should proceed to the next phase. Table 6-3 summarizes the overall results of the evaluation process.

As shown in Table 6-3, each project was given an overall ranking based on the evaluation criteria process. The Sammamish River project, Modified Sammamish River, and North Treatment Plant project were all ranked Number 1.

Based on the ranking, the Sammamish River and Modified Sammamish River projects ranked most favorably. These projects are favorable overall in the regulatory category, beneficial to the community and stakeholders, and are consistent with KCDNR planning goals. Because one project is a subset of the other, the scale of the project chosen will be determined on a number of factors. One factor is which of the two projects are perceived to best meet the goals of the Demonstration Phase and the second factor is the amount of money KCDNR will choose to invest into the Demonstration Phase.

The North Treatment Plant project was also given an overall ranking of 1. This project ranked favorably in all categories evaluated. The one item that is not included within this process is the realistic timing of implementation for the various projects. While this project did rank high, the RWSP does not call for the plant to be on-line until 2010. Further evaluation is required to assess the timing implications of this project with regard to satellite reuse facilities and the benefits to the Sammamish Valley.

The North Sammamish River received a ranking of 2. While it ranked favorable in both the regulatory and community/stakeholder category, the unit production cost was not as low as either the Sammamish River or North Treatment Plant project. It is very likely that a decision on this project would be delayed until a decision had been made on the location of the proposed regional wastewater plant and the likelihood of adding water reuse treatment processes at that facility.

TABLE 6-2
Phase I Project Nomination Ranking Notes

| Criteria | Favorable | Neutral | Less Favorable | Notes |
|---|---|---|--|---|
| REGULATORY | | | | |
| Consistent with GMA, RWSP, and regional water plans | Meets all listed items | Meets 1 or 2 of listed items | Meets none of listed items | |
| Potential water rights (based on volume) to be offset or substituted | The application site(s) allows the potential opportunity to obtain water rights (>50%) | Between 20%-50% of the application sites offer the opportunity to obtain water rights | Application site has no water rights, or less than 20% of the sites offer an opportunity to obtain water rights | Cost to obtain water rights or volume of water available are not factors included in this evaluation |
| Enhances streamflows directly or indirectly | Commitment to returns flow to stream by elimination of surface water withdrawals | Substitution of alternative water source implies that surface or groundwater would return to stream | Indication that potable water saved would be used to supply other demands rather than returned to stream | Assumed that purveyors would use "saved" water to meet other demands, unless otherwise noted |
| Beneficial to water bodies identified as 'low flows' or with endangered salmon listings | Returns flows to such identified streams and improves water quality to same streams | Return flows to streams not identified as "low flows" or endangered salmon listings | No perceived benefit to flows or endangered salmon listings | Incorporates salmon enhancement features; net water quality features |
| Liability or health issues | No perceived or identified liability or public health issues | | Similar applications in other areas have experienced perceived liability or health issues with same applications | <ul style="list-style-type: none"> - Liability i.e., degradation of groundwater - Health i.e., exposure to wastewater, pathogens, |
| Legal constraints | No known legal constraints | | Legal constraints have been identified | Restricted uses |
| Construction-related environmental impacts | Little to no perceived environmental impact | Mitigation required to siting of facilities | Severe environmental impact | Impact to wetlands, stream crossings, habitat, etc. |
| Timeliness of Permits | Easy to obtain permits <1 yr. For example, not required to obtain permits such as shorelines, Corps of Engineer 404 permit, or water rights | Moderate effort to obtain permits in 1 to 3 years | Likely to take more than 3 years to obtain permits. | |

TABLE 6-2
Phase I Project Nomination Ranking Notes

| Criteria | Favorable | Neutral | Less Favorable | Notes |
|--|---|--|---|--|
| Community/Stakeholder | | | | |
| Long-term benefits to community where facilities are located | (1) facilities and associated mitigation measures serve as enhancement to the community; (2) non potable water used within the community, replacing potable water; (3) 'freed up' water returned to fish locally or used for direct economic benefits | One or two of the measures listed under 'favorable' occur within the community | None of the measures cited under 'favorable' occur within the community | |
| Minimize long-term adverse impacts | Has little to no adverse impact to the community and environment | Has measurable long-term adverse impact to community and environment | Has substantial long-term adverse impact to community and environment | Has adverse long-term impacts defined as adverse to natural and built environment, such as ongoing odors, traffic, continuing withdrawal from waterways, habitat degradation |
| Local public and elected official support | Appears to be greater support than opposition demonstrated by public and elected officials | No public/political opinion or mixed opinions have been expressed | There appears to be more opposition than support by public and/or elected officials | Meets regional water needs; willing customers; border disputes |
| Benefits multiple stakeholders | Benefits municipalities, interest groups, neighborhood groups and/or developers | | Primarily benefits the user | |
| Financial | | | | |
| Potential for funding opportunities | Multiple funding opportunities (up to 20%) identified through cost sharing, grants or loans | Single funding opportunity (0-19%) | King County sole financier | |
| Benefit/cost ratio | B/C > X | B/C = X - X | B/C < X | The definition of 'benefit' in a financial sense is still being determined |
| Unit cost for reclaimed water produced | Unit cost < \$5.00 ccf | Unit cost = \$5.00-10.00/ccf | Unit cost > \$10.00/ccf | |

TABLE 6-2
Phase I Project Nomination Ranking Notes

| Criteria | Favorable | Neutral | Less Favorable | Notes |
|---|--|---|--|-------|
| Other | | | | |
| Integration with other KC projects | Portion of reuse project can be coordinated with KCDNR's CIP or Farm HCP | Reuse project can potentially be coordinated with future phase of KCDNR reclaimed water program | No relationship to any current or future KCDNR project; reuse project stands alone | |
| Demonstrates new 'alternative' technologies/management techniques in water and wastewater | Provides opportunity to demonstrate/research new technologies/techniques | Technology/technique currently being investigated or piloted in another location | No new technologies or techniques afforded by this project | |

Note: Criteria categories and weighting developed in November 1999 King County workshop.

TABLE 6-3
Evaluation Matrix Summary

| Category | Sammamish River | Modified Sammamish River | North Sammamish River | Newcastle | Covington | Tam O'Shanter | North Treatment Plant | Auburn/Kent Valley | Continued Pumping from the Sammamish River | Purchase of Potable Water |
|------------------------|-----------------|--------------------------|-----------------------|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|--|---------------------------|
| Regulatory | Favorable ● | Favorable ● | Favorable ● | Favorable/neutral ●/● | Favorable/neutral ●/● | Favorable/neutral ●/● | Favorable ● | Favorable/neutral ●/● | Neutral/less favorable ●/○ | Favorable/neutral ●/● |
| Community/Stakeholder | Favorable ● | Favorable ● | Favorable ● | Favorable/neutral ●/● | Favorable ● | Neutral/less favorable ●/○ | Favorable ● | Favorable ● | Less favorable ○ | Neutral ● |
| Financial | Favorable ● | Favorable ● | Neutral ●/● | Neutral ● | Neutral ●/● | Less favorable ○ | Favorable ● | Favorable ● | Favorable ● | Favorable ● |
| Other | Favorable ● | Favorable ● | Neutral ●/● | Less favorable ○ | Less favorable ○ | Less favorable ○ | Favorable ● | Favorable ● | Less favorable ○ | Neutral ● |
| Overall Ranking | 1 | 1 | 2 | 3 | 3 | 4 | 1 | 2 | --^a | --^a |

^a The alternative water supply concepts were only listed for comparison with the potential water reuse projects

The Auburn/Kent Valley project also was given a ranking of 2. This project would potentially benefit a number of stakeholders and meet KCDNR's goal of preserving farm lands. In addition, it utilizes the existing facilities at KCDNR's regional South Treatment Plant at Renton. Depending on KCDNR's reuse budget, this project or a smaller version could potentially be considered as a candidate for the Demonstration Phase.

Both the Newcastle and Covington projects were ranked 3rd overall. While the unit cost for the Covington project was lower than the Newcastle project, the Covington project is not viable until the wastewater volume available increases or additional sources of wastewater are obtained. Tam O'Shanter received a 4th ranking. The limited benefits to the community and stakeholders, as well as the unlikelihood of incorporating the project into other KCDNR programs, were viewed as factors to warrant a low rating for future analysis.

Recommendations

In evaluating the various projects submitted through the RFN process, it became apparent that there were a number of data gaps, as well as additional opportunities to be evaluated for direct non-potable applications within the Demonstration Phase of the Reclaimed Water Program. The water demands were based on actual data provided in the RFN packages, estimates from previous studies, and agronomic rates from the *State of Washington Irrigation Guide*. The data from the RFNs appeared to be based primarily on 1999 water usage; however, the summer of 1999 was relatively wet, so it is possible that the recorded water use was below average. In general, using agronomic rates resulted in higher water usage rates. Therefore, it is recommended that metering devices be applied to each potential irrigation user in the recommended demonstration project(s) to collect actual water use data. Ideally, a number of years of data could be accumulated so that seasonal variations could be taken into account. This could be done during the next few years while the implementation portion of the Demonstration Phase is progressing. These additional data would mean that final sizing and construction of facilities would be based on actual and consistent data. In addition, it is highly likely that water consumption will increase once a system becomes operational and irrigation use commences.

Based on the evaluation presented in this summary report, the following items are recommended for KCDNR to proceed with into the next stages:

- Proceed with the Modified Sammamish River into the feasibility analysis stage, i.e., engineering report, to represent the first project in KCDNR's Demonstration Phase. The engineering report can be used to define the details and refine the cost estimate.
- As appropriate, work with Ecology to apply the water right transfer and banking process to applicable water reuse users based on future project and participant determinations.
- Work with the purveyors for whom the irrigation users are located within the service area to define the agreements for providing reclaimed water. The list of purveyors included in this task will be unique for each reuse project identified.
- Establish a monitoring program to track the actual costs of the construction and operation of the satellite project chosen. Survey the users of the reclaimed water and evaluate market conditions and capacity for additional reuse opportunities.
- Continue to evaluate the potential benefits of the Auburn/Kent Valley Water Reuse Projects and continue to apply the evaluation criteria developed to assess potential reclaimed water projects.

SECTION 8

References

CH2M HILL. *Refine Alternatives for Effluent Reuse at the Blakely Ridge/Northridge UPDs*. November 1993. Prepared for the Municipality of Metropolitan Seattle.

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